M/053/005

DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

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June 7, 1988

Mr. Kraig W. Grubaugh, P.E.
Tenneco Minerals
P.O. Box 2650
955 North 1300 West #4
St. George, Utah 84770

Re: Gold Strike Mine
Plan Review Comments

Dear Mr. Stairwalt:

We have reviewed the plans and specifications submitted 28 March 1988 and apologize for the delayed response. We have the following comments:

1. Page 5. We understand that the maximum head which will build up on the flexible membrane liner with the proposed process solution collection system is one (1) inch. This low head build up without process solution collection piping is attributed to the material used to construct the process solution collection system being screened to remove the minus 1/4 inch fraction. This value is much less than our maximum allowable head of 12 inches therefore it will be allowed at your request on the following conditions:

   a. Assurances be provided that fines from the ore will not contaminate the process solution collection system, reduce the hydraulic conductivity of the material and thereby increase the head above 12 inches.

   b. Monitoring devices show a head on the flexible membrane liner of twelve (12) inches or less throughout the life of the project.

   c. If heads on the flexible membrane liner exceed twelve (12) inches on any pad and the condition is not correctable, then all subsequent pads will have process solution collection pipes installed at spacing to limit the head to twelve (12) inches or less.

2. Figures 3.2.1 and 3.2.2 It must be verified that no heap leach pads or process ponds will be constructed on recently active faults, landslides, or slump blocks. If identified, the distance from heap leach pads or process ponds to these faults or landslides must be provided.

3. Page 20 An evaluation of the impacts of estimated or differential settlement of the end dump material on the integrity of the liner system must be provided for review.

4. Page 20 The chemical stability of waste rock constituents being exposed to the environment must be evaluated to determine if metals and other contaminants will be carried into the surface water or groundwater systems.

5. Page 23 The liner system for the pads will require a leak detection system to establish the integrity of the liner system above it throughout the life of the project. Also, the response time of the leak detection system must be established and submitted for review.

6. Page 32 The annual average snowfall for this area must be established for the sizing of the process ponds.

7. Page 37 Per our meeting of 6 June 1988, we understand that the facilities proposed in the detailed plans and specifications will be under continuous substantial construction during the normal construction and mining seasons, lasting about 8 years. The construction due to site constraints will follow a cycle of mining to create fill areas from mine waste, then construction of the pad on these fill areas. Actually most of the pads will be constructed in previously mined areas or gullies once the ore has been removed.

8. Page 37 The estimated settlement for the end dump fill areas under pads and ponds must be established for the design loading of 100 feet of ore plus the liner system. The estimated settlement must be reflected in the liner system design.

9. Page 38 The Bureau of Water Pollution Control has not yet taken a position concerning the required thickness of HDPE versus any other more flexible liner material. We do have concerns about the stiff nature of HDPE, the material's requirements for a sensitive high tech field seaming process, and the integrity of the resulting field seam.

10. Page 40 The value for precipitation used for determining the head on the flexible membrane must be revised. Listed below are a portion of NOAA records for the stations closest to Gold Strike for 1978 to 1986. Five of these years exceeded the design precipitation values of 13 inches used in these calculations.

    Enterprise, Utah (elevation 5340 feet)

1986	13.89 inches
1983	18.82 inches
1982	16.00 inches
1979	13.19 inches
1978	28.61 inches

11. Page 40 Provisions must be made so all secondary containment piping or liner ditches for process solution piping will drain to the process pond or some other adequately sized and adequately lined containment.

12. The provisions which will be utilized to insure that operation of the facility can be achieved 365 days a year, i.e., drip application of leaching solutions, provisions to prevent freezing, etc., must be presented for review.

13. Page 44 The head which will develop on the pond secondary clay liner in the drainage net leak detection system must be provided for review.

14. Page 47 All leak detection systems will be required to be monitored by the construction permit on a daily basis. Notification of leakage detected will be according to the following schedule:

    a. 0-5 gallons per day (gpd) - Record volumes in log book and report to the Bureau of Water Pollution Control (BWPC) by phone within 24 hours, if leakage is detected.

    b. 5-50 gpd - Record volumes and sample for pH, gold and total and free cyanide CN^- and copper. Report findings to the BWPC by phone within 24 hours and in writing within seven (7) days.

    c. 50-500 - Record application rates. Report to the BWPC by phone within 24 hours and in writing within seven (7) days. Daily monitoring of leakage will be required with a monthly report being submitted to the BWPC. Sample for constituents required in 2b.

    d. Greater than 500 gpd - Discontinue use of that portion of the pad and provide to BWPC within seven (7) days a description of the portion of the pad not being leached. Sample for constituents required in 2b.

15. Page 47 and 49 The 60,000 gallon D.E. pond must be underlain by a leak detection system similar to the process ponds unless it can be demonstrated that the water contained therein will not be a pollution threat to the environment.

16. Page 49 The system for the disposal of sanitary wastes must be approved by the Southwest District Health Department before a construction permit will be issued.

17. Page 51 Details of the impoundment structures and silt fences must be submitted for review when the detailed project plans and specifications are submitted for review.

18. The quality of construction of the secondary clay liner must be verified to establish that the design assumptions have been achieved in the field. Each lift of all secondary clay liners constructed in pad and pond liner systems must be tested according to the following schedule:

    a. moisture/density test on a 50 ft by 50 ft grid system.

    b. Thickness verification on a 50 ft by 50 ft grid system

    c. Gradation tests on a 200 ft by 200 ft grid system

    d. Permeability tests on a 200 ft by 200 ft grid system

19. Page 55 Provisions which will be utilized to ensure that the process solution head on the flexible membrane liner will not exceed 12 inches due to the migration of fines from the ore to the process solution collection material must be presented for review.

20. Page 55 We feel a leak detection system is required to verify the integrity of the liner system for the life of the project. We will consider proposals other than outlined in our memo dated 6/1/88, provided it is comparable in function.

21. Page 55 We understand that the maximum life of the project will be no longer than 8 years.

22. Page 56 In the event that leakage is found in the pond leak detection system the Bureau of Water Pollution Control must be notified according to the schedule outlined in comment No. 14. The pond must be drained within 7 days and must not be put back into service until the leak has been repaired.

23. Page 57 It is recommended that fencing be installed soon after the flexible membrane liner is placed to prevent access of deer and other animals.

24. Page 58 The neutralization criteria for the pads must meet or be more stringent than the following. The neutralization criteria for the heap leach pad, once the leaching operations have been completed, must be established. Currently the minimum neutralization criteria in Utah are as follows:
    a. pH of 6.5 to 7.5
    b. Weak acid dissociable (WAD) cyanides less than or equal to 0.20 mg/l.
    c. Total cyanide less than or equal to 0.75 mg/l.
    d. Metals content shall meet drinking water standards or surface water quality standards which ever is more stringent.

25. Page 58 The neutralized sludges, precipitates, and solids on the pond liner must be analyzed to determine if they are a hazardous waste. If they are a hazardous waste they will be properly disposed of, otherwise they may be disposed of in the liner.

26. Appendix B page 5 We understand that the grade tolerance for the pad construction of plus or minus 1 foot relates to the surface of the engineered fill.

This concludes our comments, if you have any questions please call Mack Croft or Charlie Dietz at 538-6146.

Sincerely,

Don A. Ostler, P.E., Director
Bureau of Water Pollution Control

cc: Mike Stairwalt, Tenneco Mineral, P.O. Box 2650, St. George, UT 84770
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